

CLAIMS

I claim:

- 1 1. A fuel system for a turbine engine, comprising:
 - 2 a first premix injector assembly comprising at least four injectors, wherein at least first and second injectors of the at least four injectors of the first premix injector assembly are positioned adjacent each other in the turbine engine and at least third and fourth injectors of the at least four injectors of the first premix injector assembly are positioned adjacent each other in the turbine engine;
 - 7 a second premix injector assembly comprising at least two injectors;
 - 8 wherein at least one injector forming the second premix injector assembly is positioned between the first injector and the fourth injector of the first premix injector assembly and at least one injector forming the second premix injector assembly is positioned between the second injector and the third injector of the first premix injector assembly; and
 - 13 wherein the fuel system is capable of emitting fuel into the turbine engine through the first premix injector assembly without simultaneously emitting fuel into the turbine engine through the second premix injector assembly.
- 1 2. The fuel system of claim 1, wherein the second premix injector assembly comprises at least four injectors, wherein at least first and second injectors of the at least four injectors are positioned adjacent each other in the turbine engine and at least third and fourth injectors of the at least four injectors are positioned adjacent each other in the turbine engine, wherein the first and second injectors forming a portion of the second premix injector assembly is positioned between the first injector and the fourth injector of the first premix injector assembly and the third and fourth injectors forming a portion of the second premix injector assembly are positioned between the second injector and the third injector of the first premix injector assembly.
- 1 3. The fuel system of claim 1, wherein the fuel system is capable of emitting fuel into the turbine engine through the second premix injector assembly

3 without simultaneously emitting fuel into the turbine engine through the first premix
4 injector assembly.

1 4. The fuel system of claim 1, wherein the at least four injectors of the first
2 premix injector assembly and the at least two injectors of the second premix injector
3 assembly are spaced apart from each other a substantially equal distance.

1 5. The fuel system of claim 1, wherein the at least four injectors of the first
2 premix injector assembly and the at least two injectors of the second premix injector
3 assembly are positioned equidistant from a pilot nozzle and form a ring around the
4 pilot nozzle.

1 6. The fuel system of claim 1, wherein the at least four injectors of the first
2 premix injector assembly and the at least two injectors of the second premix injector
3 assembly are aligned substantially parallel to each other.

1 7. The fuel system of claim 1, wherein the at least two injectors of the
2 second premix injector assembly comprise at least four injectors.

1 8. The fuel system of claim 7, wherein each injector of the first and
2 second premix injector assemblies is separated from each other by about 45
3 degrees relative to a longitudinal axis of the combustor.

1 9. A fuel system for a turbine engine, comprising:
2 a first premix injector assembly comprising at least four injectors, wherein at
3 least first and second injectors of the at least four injectors of the first premix injector
4 assembly are positioned adjacent each other in the turbine engine and at least third
5 and fourth injectors of the at least four injectors of the first premix injector assembly
6 are positioned adjacent each other in the turbine engine;
7 a second premix injector assembly comprising at least four injectors, wherein
8 at least first and second injectors of the at least four injectors of the second premix
9 injector assembly are positioned adjacent each other in the turbine engine and at

10 least third and fourth injectors of the at least four injectors of the second premix
11 injector assembly are positioned adjacent each other in the turbine engine;
12 wherein the first and second injectors forming a portion of the first premix
13 injector assembly are positioned between the first and fourth injectors forming a
14 portion of the second premix injector assembly and the third and fourth injectors
15 forming a portion of the first premix injector assembly are positioned between the
16 second and third injectors forming a portion of the second premix injector assembly;
17 and

18 wherein the fuel system is capable of emitting fuel into the turbine engine
19 through the first premix injector assembly without simultaneously emitting fuel into
20 the turbine engine through the second premix injector assembly.

1 10. The fuel system of claim 9, wherein the fuel system is capable of
2 emitting fuel into the turbine engine through the second premix injector assembly
3 without simultaneously emitting fuel into the turbine engine through the first premix
4 injector assembly.

1 11. The fuel system of claim 9, wherein the at least four injectors of the first
2 premix injector assembly and the at least four injectors of the second premix injector
3 assembly are spaced apart from each other a substantially equal distance.

1 12. The fuel system of claim 9, wherein the at least four injectors of the first
2 premix injector assembly and the at least four injectors of the second premix injector
3 assembly are positioned equidistant from a pilot nozzle and form a ring around the
4 pilot nozzle.

1 13. The fuel system of claim 9, wherein each injector of the first and
2 second premix injector assemblies is separated from each other by about 45
3 degrees relative to a longitudinal axis of the combustor.

1 14. The fuel system of claim 9, wherein the at least four injectors of the first
2 premix injector assembly and the at least four injectors of the second premix injector
3 assembly are positioned substantially parallel to each other.

1 15. A method for reducing a size of an interface between fueled and
2 unfueled regions in a fuel system of a turbine engine operating in fuel staging
3 condition, comprising:

4 supplying fuel to a first premix injector assembly of a fuel system comprising a
5 first premix injector assembly and a second premix injector assembly, the first premix
6 injector assembly comprising at least four injectors positioned adjacent each other in
7 the turbine engine and the second premix injector assembly comprising at least two
8 injectors positioned adjacent each other in the turbine engine and adjacent to the at
9 least two injectors of the first premix injector assembly; and

10 emitting fuel from the at least four injectors of the first premix injector
11 assembly without simultaneously ejecting fuel from the second premix injector
12 assembly.

1 16. The fuel system of claim 15, wherein emitting fuel from the at least four
2 injectors of the first premix injector assembly comprises emitting fuel through at least
3 first, second, third and fourth ejectors, wherein the first and second ejectors are
4 adjacent each other and the third and fourth ejectors are adjacent each other and the
5 first and fourth injectors of the first premix injector assembly are separated by at
6 least one injector of the second premix injector assembly and the second and third
7 injectors of the first premix assembly are separated by at least one injector of the
8 second premix injector assembly.

1 17. The fuel system of claim 15, wherein emitting fuel from the at least four
2 injectors of the first premix injector assembly comprises emitting fuel through at least
3 first, second, third and fourth ejectors, wherein the first and second ejectors are
4 adjacent each other and the third and fourth ejectors are adjacent each other and the
5 first and fourth injectors of the first premix injector assembly are separated by at
6 least two injectors of the second premix injector assembly and the second and third

7 injectors of the first premix assembly are separated by at least two injectors of the
8 second premix injector assembly.